Claims

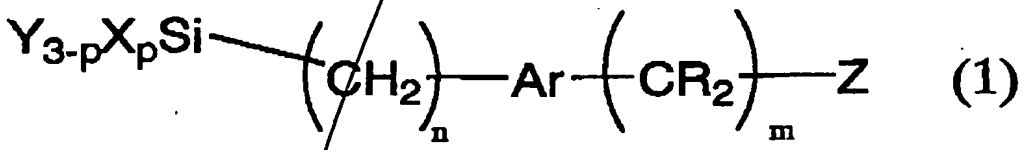
1. A method for manufacturing a molecular film pattern comprising:

a step of forming a molecular film by using a photolytic organic silicon compound that contains an aromatic hydrocarbon group, as a starting material; and a step of irradiating the molecular film with a light.

2. A method for manufacturing a molecular film pattern comprising:

a step of forming a molecular film by using an organic silicon compound as a starting material, the organic silicon compound having a chemical structure represented by the following formula (1); and a step of irradiating the molecular film with a light;

[Chemical 1]



$$Y_{3-p}X_pSi-\left(CH_2\right)_n-Ar-\left(CR_2\right)_m-Z \qquad (1)$$

wherein n, m, p, Ar, X, Y, and R in the formula are as follows:

n is an integer of 0 or more;

m is an integer of 0 or more;

p is an integer of 0 or more;

Ar is an aryl group;

R is a hydrogen atom or a fluorine atom;

X is a halogen group such as a chlorine group, an amino group, or an alkoxyl group;

Y is an alkyl group, an aryl group, or a hydrogen atom; and

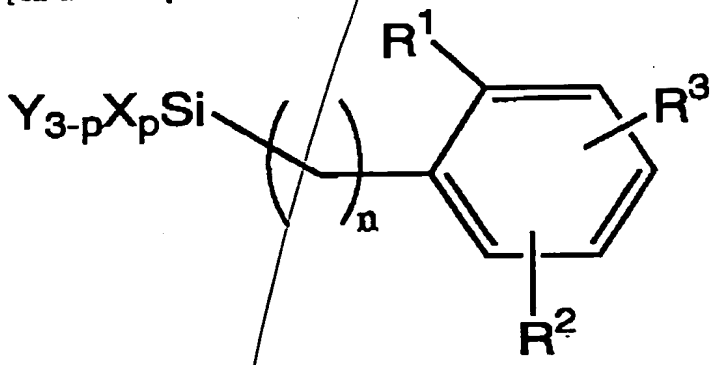
Z is an alkyl group, a perfluoroalkyl group, a silyl group, a cyano

group, an amino group, or a thiol group.

3. A method for manufacturing a molecular film pattern comprising:

a step of forming a molecular film by using an organic silicon compound as a starting material, the organic silicon compound having a chemical structure represented by the following formula (2); and a step of irradiating the molecular film with a light;

[Chemical 2]



(2)

wherein n, p, R^1, R^2, R^3, X, and Y in the formula are as follows:

n is an integer of 0 or more;

p is an integer of 0 or more;

R^1 is a hydrogen atom, a halogen atom, a perfluoroalkyl group, a hydroxyl group, a thiol group, an amino group, an alkylamino group, an alkoxyl group, an alkyl group containing a hydroxyl group, an alkyl group containing a thiol group, an alkyl group containing an amino group, or an alkyl group containing an alkylamino group;

R^2 is a hydrogen atom, a halogen atom, a perfluoroalkyl group, a hydroxyl group, a thiol group, an amino group, an alkylamino group, an alkoxyl group, an alkyl group containing a hydroxyl group, an alkyl

group containing a thiol group, an alkyl group containing an amino group, an alkyl group containing an alkylamino group, an organic silicon group, or an alkyl group containing an organic silicon group;

R^3 is a halogen atom, a perfluoroalkyl group, a hydroxyl group, a thiol group, an amino group, an alkylamino group, an alkoxyl group, an alkyl group containing a hydroxyl group, an alkyl group containing a thiol group, an alkyl group containing an amino group, an alkyl group containing an alkylamino group, an organic silicongroup, an alkyl group containing an organic silicon group, an aryl group, or an alkyl group containing an aryl group;

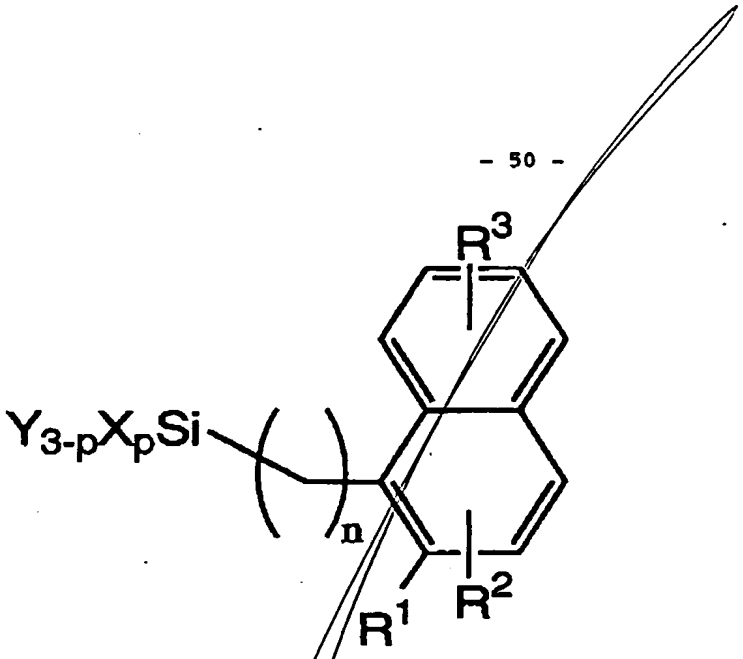
X is a halogen group such as a chlorine group, an amino group, or an alkoxyl group; and

Y is an alkyl group or an aryl group.

4. A method for manufacturing a molecular film pattern comprising:

a step of forming a molecular film by using an organic silicon compound as a starting material, the organic silicon compound having a chemical structure represented by the following formula (3); and a step of irradiating the molecular film with a light;

[Chemical 3]



(3)

wherein n, p, R^1, R^2, R^3, X, and Y in the formula are as follows:

n is an integer of 0 or more;

p is an integer of 0 or more;

R^1 is a hydrogen atom, a halogen atom, a perfluoroalkyl group, a hydroxyl group, a thiol group, an amino group, an alkylamino group, an alkoxyl group, an alkyl group containing a hydroxyl group, an alkyl group containing a thiol group, an alkyl group containing an amino group, or an alkyl group containing an alkylamino group;

R^2 is a hydrogen atom, a halogen atom, a perfluoroalkyl group, a hydroxyl group, a thiol group, an amino group, an alkylamino group, an alkoxyl group, an alkyl group containing a hydroxyl group, an alkyl group containing a thiol group, an alkyl group containing an amino group, an alkyl group containing an alkylamino group, an organic silicon group, or an alkyl group containing an organic silicon group;

R^3 is a hydrogen atom, a halogen atom, a perfluoroalkyl group, a hydroxyl group, a thiol group, an amino group, an alkylamino group, an

alkoxyl group, an alkyl group containing a hydroxyl group, an alkyl group containing a thiol group, an alkyl group containing an amino group, an alkyl group containing an alkylamino group, an organic silicon group, or an alkyl group containing an organic silicon group;

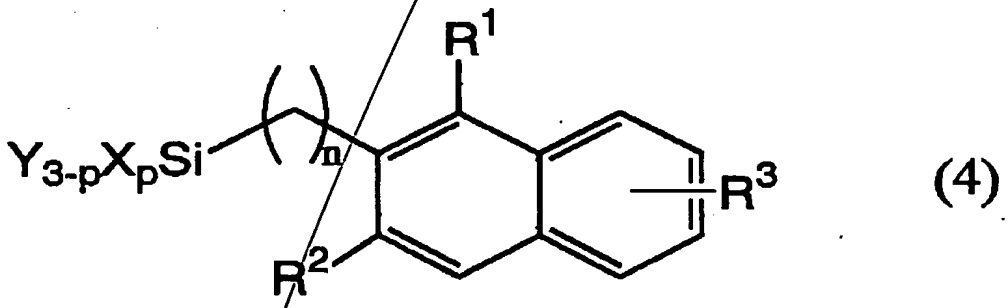
X is a halogen group such as a chlorine group, an amino group, or an alkoxyl group; and

Y is an alkyl group or an aryl group.

5. A method for manufacturing a molecular film pattern comprising:

a step of forming a molecular film by using an organic silicon compound as a starting material, the organic silicon compound having a chemical structure represented by the following formula (4); and a step of irradiating the molecular film with a light;

[Chemical 4]



(4)

wherein n, p, R^1, R^2, R^3, X, and Y in the formula are as follows:

n is an integer of 0 or more;

p is an integer of 0 or more;

R^1 is a hydrogen atom, a halogen atom, a perfluoroalkyl group, a hydroxyl group, a thiol group, an amino group, an alkylamino group, an alkoxyl group, an alkyl group containing a hydroxyl group, an alkyl

group containing a thiol group, an alkyl group containing an amino group, or an alkyl group containing an alkylamino group;

R^2 is a hydrogen atom, a halogen atom, a perfluoroalkyl group, a hydroxyl group, a thiol group, an amino group, an alkylamino group, an alkoxyl group, an alkyl group containing a hydroxyl group, an alkyl group containing a thiol group, an alkyl group containing an amino group, an alkyl group containing an alkylamino group, an organic silicon group, or an alkyl group containing an organic silicon group;

R^3 is a hydrogen atom, a halogen atom, a perfluoroalkyl group, a hydroxyl group, a thiol group, an amino group, an alkylamino group, an alkoxyl group, an alkyl group containing a hydroxyl group, an alkyl group containing a thiol group, an alkyl group containing an amino group, an alkyl group containing an alkylamino group, an organic silicon group, or an alkyl group containing an organic silicon group;

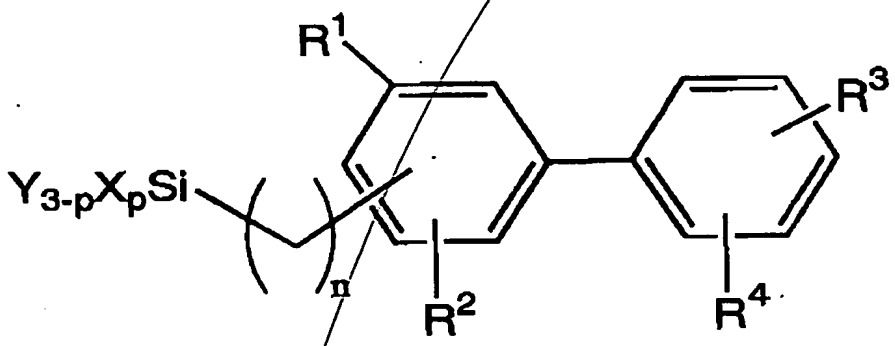
X is a halogen group such as a chlorine group, an amino group, or an alkoxyl group; and

Y is an alkyl group or an aryl group.

6. A method for manufacturing a molecular film pattern comprising:

a step of forming a molecular film by using an organic silicon compound as a starting material, the organic silicon compound having a chemical structure represented by the following formula (5); and a step of irradiating the molecular film with a light;

[Chemical 5]



(5)

wherein n, p, R^1, R^2, R^3, R^4, X, and Y in the formula are as follows:

n is an integer of 0 or more;

p is an integer of 0 or more;

R^1 is a hydrogen atom, a halogen atom, a perfluoroalkyl group, a hydroxyl group, a thiol group, an amino group, an alkylamino group, an alkoxyl group, an alkyl group containing a hydroxyl group, an alkyl group containing a thiol group, an alkyl group containing an amino group, or an alkyl group containing an alkylamino group;

R^2 is a hydrogen atom, a halogen atom, a perfluoroalkyl group, a hydroxyl group, a thiol group, an amino group, an alkylamino group, an alkoxyl group, an alkyl group containing a hydroxyl group, an alkyl group containing a thiol group, an alkyl group containing an amino group, an alkyl group containing an alkylamino group, an organic silicon group, or an alkyl group containing an organic silicon group;

R^3 is a halogen atom, a perfluoroalkyl group, a hydroxyl group, a thiol group, an amino group, an alkylamino group, an alkoxyl group, an alkyl group containing a hydroxyl group, an alkyl group containing a thiol group, an alkyl group containing an amino group, an alkyl group

containing an alkylamino group, an organic silicon group, or an alkyl group containing an organic silicon group;

R^4 is a hydrogen atom, a halogen atom, a perfluoroalkyl group, a hydroxyl group, a thiol group, an amino group, an alkylamino group, an alkoxyl group, an alkyl group containing a hydroxyl group, an alkyl group containing a thiol group, an alkyl group containing an amino group, an alkyl group containing an alkylamino group, an organic silicon group, or an alkyl group containing an organic silicon group;

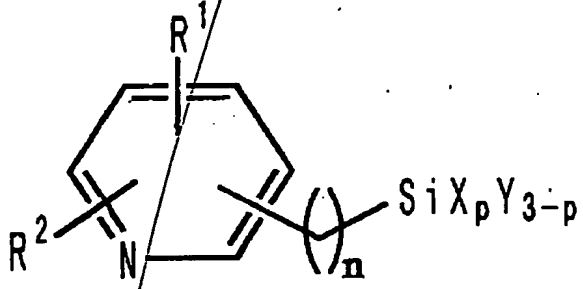
X is a halogen group such as a chlorine group, an amino group, or an alkoxyl group; and

Y is an alkyl group or an aryl group.

7. A method for manufacturing a molecular film pattern comprising:

a step of forming a molecular film by using an organic silicon compound as a starting material, the organic silicon compound having a chemical structure represented by the following formula (6); and a step of irradiating the molecular film with a light;

[Chemical 6]



(6)

wherein n, p, R^1, R^2, X, and Y in the formula are as follows:

n is an integer of 0 or more;

p is an integer of 0 or more;

R^1 is a hydrogen atom, a halogen atom, a perfluoroalkyl group, a hydroxyl group, a thiol group, an amino group, an alkylamino group, an alkoxyl group, an alkyl group containing a hydroxyl group, an alkyl group containing a thiol group, an alkyl group containing an amino group, or an alkyl group containing an alkylamino group;

R^2 is a halogen atom, a perfluoroalkyl group, a hydroxyl group, a thiol group, an amino group, an alkylamino group, an alkoxyl group, an alkyl group containing a hydroxyl group, an alkyl group containing a thiol group, an alkyl group containing an amino group, an alkyl group containing an alkylamino group, an organic silicon group, an alkyl group containing an organic silicon group, an aryl group, or an alkyl group containing an aryl group;

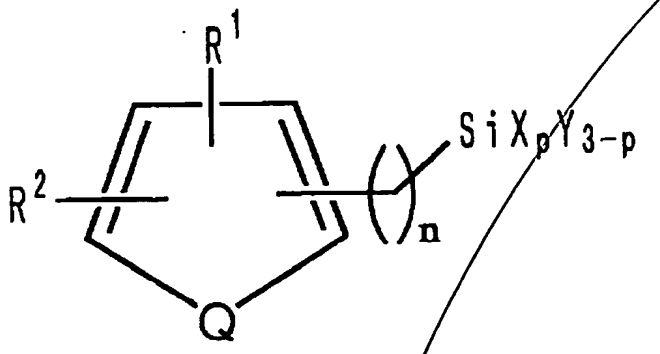
X is a halogen group such as a chlorine group, an amino group, or an alkoxyl group; and

Y is an alkyl group or an aryl group.

8. A method for manufacturing a molecular film pattern comprising:

a step of forming a molecular film by using an organic silicon compound as a starting material, the organic silicon compound having a chemical structure represented by the following formula (7); and a step of irradiating the molecular film with a light;

[Chemical 7]



(7)

wherein n, p, R^1, R^2, X, Y, and Q in the formula are as follows:

n is an integer of 0 or more;

p is an integer of 0 or more;

R^1 is a hydrogen atom, a halogen atom, a perfluoroalkyl group, a hydroxyl group, a thiol group, an amino group, an alkylamino group, an alkoxyl group, an alkyl group containing a hydroxyl group, an alkyl group containing a thiol group, an alkyl group containing an amino group, or an alkyl group containing an alkylamino group;

R^2 is a halogen atom, a perfluoroalkyl group, a hydroxyl group, a thiol group, an amino group, an alkylamino group, an alkoxyl group, an alkyl group containing a hydroxyl group, an alkyl group containing a thiol group, an alkyl group containing an amino group, an alkyl group containing an alkylamino group, an organic silicon group, an alkyl group containing an organic silicon group, an aryl group, or an alkyl group containing an aryl group;

X is a halogen group such as a chlorine group, an amino group, or an alkoxyl group;

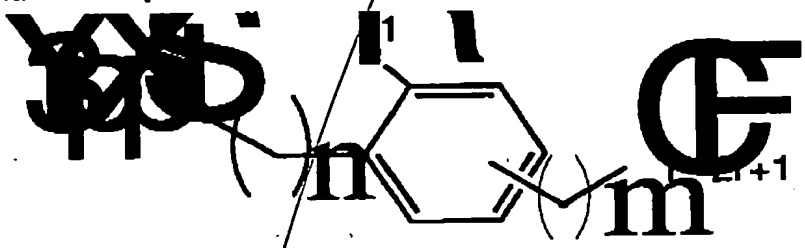
Y is an alkyl group or an aryl group; and

Q is a nitrogen (N) atom, an oxygen (O) atom, or a sulfur (S) atom, each having a hydrogen atom or an alkyl group.

9. A method for manufacturing a molecular film pattern comprising:

a step of forming a molecular film by using an organic silicon compound as a starting material, the organic silicon compound having a chemical structure represented by the following formula (8); and a step of irradiating the molecular film with a light;

[Chemical 8].



(8)

wherein n, m, r, p, R^1, X, and Y in the formula are as follows:

n is an integer of 0 or more;

m is an integer of 0 or more;

r is a positive integer;

p is an integer of 0 or more;

R^1 is a hydrogen atom, a halogen atom, a perfluoroalkyl group, a hydroxyl group, a thiol group, an amino group, an alkylamino group, an alkoxyl group, an alkyl group containing a hydroxyl group, an alkyl group containing a thiol group, an alkyl group containing an amino group, or an alkyl group containing an alkylamino group;

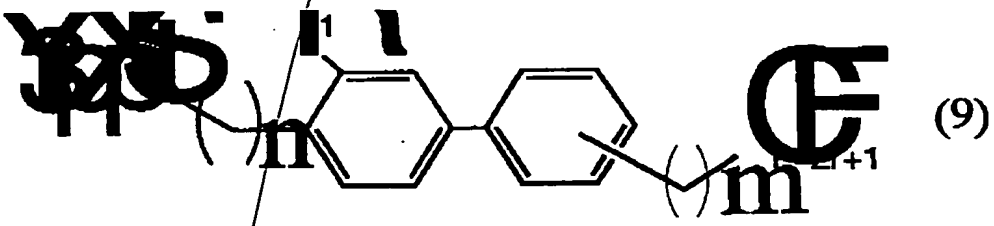
X is a halogen group such as a chlorine group, an amino group, or an alkoxyl group; and

Y is an alkyl group or an aryl group.

10. A method for manufacturing a molecular film pattern comprising:

a step of forming a molecular film by using an organic silicon compound as a starting material, the organic silicon compound having a chemical structure represented by the following formula (9); and a step of irradiating the molecular film with a light;

[Chemical 9]



(9)

wherein n, m, r, p, R^1, X, and Y in the formula are as follows:

n is an integer of 0 or more;

m is an integer of 0 or more;

r is a positive integer;

p is an integer of 0 or more;

R^1 is a hydrogen atom, a halogen atom, a perfluoroalkyl group, a hydroxyl group, a thiol group, an amino group, an alkylamino group, an alkoxyl group, an alkyl group containing a hydroxyl group, an alkyl group containing a thiol group, an alkyl group containing an amino group, or an alkyl group containing an alkylamino group;

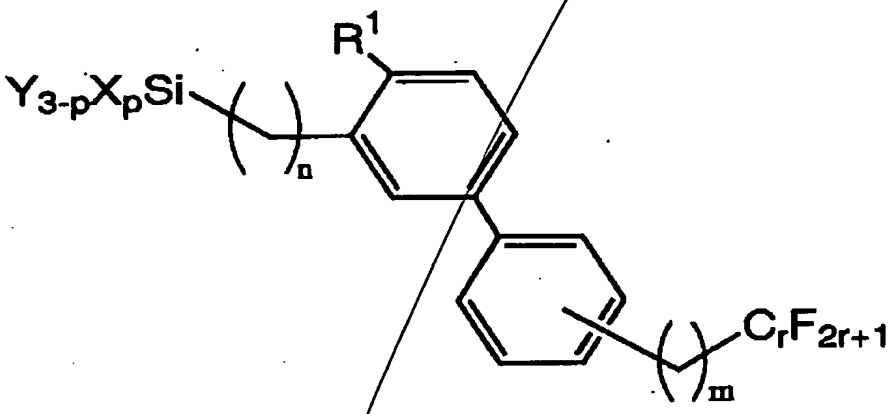
X is a halogen group such as a chlorine group, an amino group, or an alkoxyl group; and

Y is an alkyl group or an aryl group.

11. A method for manufacturing a molecular film pattern comprising:

a step of forming a molecular film by using an organic silicon compound as a starting material, the organic silicon compound having a chemical structure represented by the following formula (10); and a step of irradiating the molecular film with a light;

[Chemical 10]



(10)

wherein n, m, r, p, R^1, X, and Y in the formula are as follows:

n is an integer of 0 or more;

m is an integer of 0 or more;

r is a positive integer;

p is an integer of 0 or more;

R^1 is a hydrogen atom, a halogen atom, a perfluoroalkyl group, a hydroxyl group, a thiol group, an amino group, an alkylamino group, an alkoxyl group, an alkyl group containing a hydroxyl group, an alkyl group containing a thiol group, an alkyl group containing an amino group, or an alkyl group containing an alkylamino group;

X is a halogen group such as a chlorine group, an amino group, or an alkoxyl group; and

Y is an alkyl group or an aryl group.

12. A method for manufacturing a molecular film pattern according to one of Claims 3, 4, 5, 6, 9, 10, and 11,

wherein R^1 of the organic silicon compound is a perfluoroalkyl group.

13. A method for manufacturing a molecular film pattern according to one of Claims 3, 4, 5, 6, 9, 10, and 11,

wherein R^1 of the organic silicon compound is a trifluoromethyl group.

14. A method for manufacturing a molecular film pattern according to one of Claims 1 to 13,

wherein the thickness of the molecular film is 3 nm or less.

15. A molecular film pattern formed by a method for manufacturing a molecular film pattern according to one of Claims 1 to 14.

16. A method for manufacturing a semiconductor device comprising:

a step of forming a molecular film pattern according to a method for manufacturing a molecular film pattern recited in one of Claims 1 to 14.

17. A semiconductor device formed by a method for manufacturing a semiconductor device according to Claim 16.

18. A method for manufacturing an electro-optical device comprising:

a step of forming a molecular film pattern according to a method for manufacturing a molecular film pattern recited in one of Claims 1 to

19. An electro-optical device formed by a method for manufacturing an electro-optical device according to Claim 18.

20. A semiconductor device according to Claim 17,

wherein the semiconductor device comprises an area composed of an organic material.

21. An electro-optical device according to Claim 19,

wherein the electro-optical device comprises an organic electroluminescent element.

22. A method for manufacturing an electronic device comprising:

a step performed by using a method for manufacturing a molecular film pattern recited in one of Claims 1 to 14.

23. An electronic apparatus comprising an electro-optical device according to Claim 19 or 21 as a display portion.